

## BLOOD REPLACEMENT AFTER HAEMORRHAGE

WITH AN ILLUSTRATIVE CASE \*

BY

WILLIAM HUNTER, M.D.

HONORARY ASSISTANT OBSTETRICIAN, PRINCESS MARY MATERNITY HOSPITAL, NEWCASTLE-ON-TYNE

Some twelve months ago I read a contribution before a meeting of this society in which I brought forward some suggestions relating to the treatment of the post-haemorrhagic state.† Since that date a number of points have been raised in various quarters, so, with your permission, I shall take this opportunity for making a few further observations on the subject.

### Outline of Procedure

The following are, in brief, the essentials of the procedure which I advocate. With the patient lying in bed with not more than one pillow, warmth is provided by means of blankets and suitably protected hot-water bottles; the head is lowered, the bed being levelled before a catheter is passed or an intravenous infusion is commenced; sedatives, of which morphine salts seem to be the most efficient, are given to allay anxiety and restlessness; and fluid is provided by way of the mouth and rectum. Bandaging of the limbs entails avoidable disturbance of the patient, and the application of an abdominal binder tends to hamper still further the already embarrassed respiration, and for these reasons such treatment is not favoured. Circulatory stimulants were found to be of very doubtful efficacy, therefore they are not given unless special indications are present. If the blood pressure falls to 80 mm. Hg, or fails to rise above 90 mm. Hg after routine nursing treatment, a pint of ephedrine-glucose-gum solution is slowly infused into a vein; and if, in spite of this treatment, inanition persists, or recurrent syncopal attacks and sighing respiration continue, preparations are made for the performance of a blood transfusion.

The method of blood replacement after severe haemorrhage is an important problem not infrequently encountered in obstetric practice. Intravenous infusion is necessary in the more serious cases, as the state is an acute one, and fluid should be introduced into the blood vessels, where it is urgently required, without delay. Indirect methods, such as the subcutaneous or intravenous drip methods, are too slow when the blood pressure is very low, as absorption is delayed, and the patient will retrogress until the veins are filled. When the condition of the patient is so grave that intravascular infusion is indicated, the choice of the fluid for injection is a matter for careful consideration.

### The Fluid for Infusion

The qualities of the ideal solution would be such that it would raise the blood pressure to normal levels after infusion, remain in the vascular system, restore an efficient circulation, and counteract tissue starvation and anoxaemia. The only liquid which has properties approximating those of the ideal solution is whole blood, but the preliminaries, including the finding of a suitable donor and the matching of the bloods, which must be carried out before a blood transfusion can begin, often take three

or four hours to complete. During this interval it is possible that a serious retrogression will take place unless other active treatment is undertaken.

After having tried several alternatives, I have decided that the most efficient solution for intravenous infusion in this class of case is one with the following composition:

Ephedrine hydrochloride	...	...	1 grain
Glucose	...	...	440 grains
Gum acacia	...	...	525 "
Water	...	...	to 1 pint

which may be reinforced by an intramuscular injection of ten units of insulin.

The blood pressure level is dependent upon the volume and viscosity of the blood, the peripheral resistance, and the force of the ventricular contraction. Ephedrine-glucose-gum solution, on introduction into a vein after a blood loss, restores the diminished blood volume to an appreciable extent, and, by reason of its colloidal nature, is likely to be retained in the vascular system. Its viscosity is almost the same as that of normal blood, and the ephedrine which it contains helps to raise the peripheral resistance. Further, the intravenous infusion of this fluid ensures that adequate venous filling of the heart will take place during diastole, and therefore that the force of the ventricular contraction will approximate to normality.

In an efficient circulation the blood pressure approaches normality, an adequate supply of oxygen and of nutrient is made available to the tissues, and waste products are satisfactorily removed. This solution, on infusion, raises the fallen blood pressure following exsanguination by the means to which I have just referred. If not given in excessive quantities, although it does not provide erythrocytes, it accelerates the circulation and keeps those already present in motion, therefore ensuring that they will work with maximum efficiency to aid oxygenation of the tissues and to dispose of waste products. In addition, it supplies glucose directly to the tissues, and the adsorption and utilization of this glucose is assisted by an intramuscular injection of insulin.

In practice it has been found that the procedure which I have outlined can be most helpful if properly applied. The only important contraindication to its use seems to be surgical shock, which may be adversely affected by ephedrine.

### Case Report

The following case illustrates the application of this technique with a favourable response.

Mrs. X was admitted to the Princess Mary Maternity Hospital in December, 1935, as a case of incomplete abortion at three months' gestation. She had missed one menstrual period, and, since that time, had had two months' intermittent uterine haemorrhage of minor degree. Twelve hours before her admission to hospital a profuse haemorrhage commenced, and this stopped after vaginal plugging by her medical attendant.

On arrival at the hospital she was unconscious and grossly collapsed, her skin being pallid and cold, her breath cold, and her limbs flaccid. Her pulse was impalpable at the wrist, and her heart rate was uncountable at the apex. The systolic blood pressure was between 70 and 80 mm. Hg, and the diastolic blood pressure could not be ascertained.

Routine nursing measures, such as application of warmth and lowering of the head, were instituted without delay. A few minutes later the median cubital vein was dissected out without the aid of any anaesthetic, and the patient did not seem to realize that any interference was taking place. When the collapsed vein was incised, one or two drops of dark russet blood escaped from its lumen. A pint of ephedrine-glucose-gum solution was slowly infused into the vein, and ten units of insulin were injected intramuscularly. After the solution had been flowing for about ten minutes vaginal haemorrhage recommenced, so the pack was withdrawn and

\* A communication read before the North of England Obstetrical and Gynaecological Society, May 22nd, 1936.

† *Journ. Obstet. and Gynaecol. British Empire*, 1935, xlii, No. 5, 852.

the uterine contents were removed digitally, without any resistance or sign of discomfort on the part of the patient.

On completion of the infusion the excessively rapid radial pulse could be felt, and the patient lazily opened her eyes but did not seem to appreciate her surroundings. The lethargy persisted, but with slight uneasiness, and, as no further improvement took place, one-sixth of a grain of morphine was given, and a transfusion of one pint of citrated blood was commenced three and a half hours later—that is, as soon as a suitable donor could be obtained. Again no anaesthetic was necessary for incising the arm. After this transfusion the patient seemed to realize where she was, and, although cerebration was slow, she could reply to questions, her answer usually being limited to "Yes" or "No." The colour of her lips had improved and her pulse was more readily palpable, but, as there was no evidence of further progress, a second pint of blood was transfused two hours later, as a result of which her condition showed a marked improvement. Directly after the transfusion the patient herself initiated conversation, apologized for having caused so much trouble, and thanked the staff for all they had done for her, saying that she now felt much better.

She made good progress while in hospital, although she had several rigors without localizing evidences or continued pyrexia during her stay, and was sent home eighteen days later with a note for her doctor suggesting a further period of rest and massive doses of iron. She stayed in bed at home for a fortnight, and, on rising, developed oedema of the feet. As a precautionary measure she was kept in bed for another ten days, since when her convalescence has been uneventful. Now her erythrocyte count is 5,200,000, her haemoglobin percentage is 65, and she states she is no worse for her experience.

#### Commentary

This was a case in which the indications for a blood transfusion were certainly present, yet, had she not been given the emergency infusion of ephedrine-glucose-gum solution, I am satisfied in my own mind that she would not have been alive when the preliminaries for a blood transfusion had been completed. It is a stubborn fact that a timely, life-saving simple infusion is invariably more efficacious than a post-mortem blood transfusion.

## Clinical Memoranda

### Two Cases of Tetanus Cured by Massive Intravenous Antitoxin

Whereas there is unanimity of opinion in the treatment of tetanus with antitoxin, there still remains considerable lack of agreement as to the best method of administration, also whether a single dose should be given or frequent smaller amounts. Clearly, the appearance of the symptoms of tetanus shows that whatever toxin is in circulation in the blood stream some portion of it must have attacked, and possibly have become adsorbed to, the motor nerve cells. It is in order to neutralize this toxin that the intrathecal route of administration has been advised, and W. H. Park, with M. Nicoll,<sup>1</sup> following work on guinea-pigs, favour this route in preference to the intravenous. H. Florey and P. Fildes,<sup>2</sup> comparing the two routes in rabbits, found that one had no superiority over the other. There is equal diversity of opinion among clinicians.

However, Leslie Cole<sup>3</sup> has recently made a thorough investigation, and from his series of cases it appears that the intravenous route is the more satisfactory; with E. T. C. Spooner he has considered the question of dosage. They have demonstrated that, following the intravenous injection of 200,000 international units, there remain, after fourteen days, between 3 and 5 units of antitoxin per c.cm. of circulating blood, and even after twenty-eight days about 1 unit per c.cm. was still present. It appears,

therefore, that in future the antitoxin treatment of tetanus will consist of massive single doses administered intravenously.

The following two cases may be of interest, the treatment being substantially on these lines.

#### CASE 1

A labourer aged 26 ran a nail through his boot fifteen days before admission to hospital, giving rise to sepsis of toe, first noticed three days later, healing rapidly. Four days before admission to hospital the mouth could not be opened completely; this was followed in two days by stiffness of back. There were no other symptoms.

On admission the following were noted: Risus sardonius, trismus, tonic rigidity of neck, back, chest, and abdomen. Healed wound on right small toe. Temperature 100°, pulse 112. General condition good.

Immediate treatment: Lumbar puncture; C.S.F. under slight extra pressure; 4,000 int. units A.T.S. given intrathecally, 16,000 intravenously.

Subsequent treatment and progress: Reflex spasms the day after admission, persisting for three days; never severe or frequent. On second day 200,000 units given intravenously, and during the next three days a further 200,000 units were administered by the same route. Temperature and pulse rate had fallen to normal. At the end of ten days trismus and rigidity of neck and back had passed off. Patient was discharged eighteen days after admission, abdominal hypertonus persisting for a further two weeks.

#### CASE 2

A boy aged 10 cut his leg while playing three weeks before admission, the cut healing with slight suppuration. Three days before admission he complained of inability to open the mouth properly. No other symptoms.

On admission the following were noted: Marked risus sardonius and trismus. No other tonic rigidity. Small granulating abrasion on right leg. Temperature 100.2°, pulse 124. General condition good.

Immediate treatment: 180,000 int. units A.T.S. given intravenously.

Subsequent treatment and progress: Abdominal hypertonus present the day following admission; 40,000 units given intravenously. Temperature and pulse rate normal on third day. Twelve days after admission trismus had passed off, and abdominal muscle tone was normal. Patient discharged twenty days after admission.

HENRY CANWARDEN,  
Assistant Medical Officer, Central  
Middlesex County Hospital.

Willesden, N.W.10.

#### REFERENCES

- <sup>1</sup> Park, W. H., and Nicoll, M.: *Journ. Amer. Med. Assoc.*, 1914, lxi, 235.
- <sup>2</sup> Florey, H., and Fildes, P.: *Brit. Journ. Exper. Path.*, 1927, viii, 393.
- <sup>3</sup> Cole, Leslie, and Spooner, E. T. C.: *Quart. Journ. Med.*, 1935, N.S., iv, 295.

### Double Primary Carcinoma of Colon

The occurrence of two primary carcinomata simultaneously in different organs of the body is uncommon, but by no means rare. Major, in 1919, collected 628 such cases recorded up to that date, but in by far the majority of these the lesions were found neither in the same structures nor at the same time.

Two or more primary malignant growths, however—if rodent ulcers are excluded—present at the same time and in the same organ are rare enough, I think, to be worthy of record. Abel, in 1929, reported three cases of two separate and distinct carcinomata of the large bowel present at the same time. In the discussion following Norbury's paper at the Royal Society of Medicine in 1930 Lockhart-Mummery recorded five cases of double carcinomata in the large intestine, but these were not all simultaneous; two cases were reported from St. Bartholomew's Hospital and two from St. Thomas's Hospital.